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EXAMINER	
WILLIAMS, LAWRENCE B	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/904,432	RAGHAVAN, SREEN	
	Examiner	Art Unit	
	Lawrence B Williams	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,13-17,19-35 and 37-52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13-17,19-35 and 37-52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "201-P, 210-P, 220-P" has been used to designate different transceivers in Fig. 2A. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 33 is objected to because of the following informalities: Examiner suggests applicant replace the word "filter" in line 1 with "filtering".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

3. Claims 1-52 are rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicant(s) regard as their invention. Evidence that claims 1-50 fail(s) to correspond in scope with that which applicant(s) regard as the invention can be found in the specification, pg. 12, paragraph [0012], pg. 10, paragraph [0039], pg. 8, paragraph [0034]. Each of these paragraphs cite that the transmission channel can be any transmission channel, including, "optical channels, wireless channels or metallic conductor channels". In applicant's reply filed 12 August 2005, applicant has amended independent claims, 1, 27, 44, and 46 to limit the invention to channels on a "conducting medium" which is different from what is defined in the specification.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-2, 13-16, 19, 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Lindholm (US Patent 6,477,207 B1).

(1) With regard to claim 1, Lindholm discloses in Fig. 4, a communication system, comprising: a transmitter (42), the transmitter coupled to receive N parallel bits of data and transmit the N parallel bits of data into K frequency separated channels on a conducting

transmission medium (col. 6, lines 1-15), where N and K are integers (pg. 15, line 19 - pg. 16, line 2); and a receiver (46) coupled to receive data from the K frequency separated channels from the transmission medium and recover the N parallel bits of data (col. 6, lines 26-34).

(2) With regard to claim 2, Lindholm also discloses in Fig. 4, wherein the transmitter comprises a bit allocation circuit (41) that receives the N parallel bits of data and creates K subsets of data bits; K modulators (A1-An), wherein each of the K modulators encodes one of the K subsets of the N parallel bits of data and creates an output signal modulated at a carrier frequency associated with one of the K frequency separated channels; and an adder (43) that receives the output signal from each of the K modulators and generates a transmit sum signal for transmission on the transmission medium.

(3) With regard to claim 13, Lindholm also discloses wherein a subset of bits at a lower carrier frequency contains fewer bits than a subset of bits associated with a higher carrier frequency (col. 5, lines 48-50).

(4) With regard to claim 14, Lindholm also discloses wherein each of the K subset of bits include the same number of data bits (col. 5, lines 48-50).

(5) With regard to claim 15, claim 15 inherits all limitations of claim 2 above. As noted above, Lindholm discloses all limitations of claim 2 above. Furthermore, Lindholm also discloses wherein the receiver (46) comprises: K demodulators (B1-Bn), each of the K demodulators coupled to receive a signal from the transmission medium, the signal being the transmit sum signal transmitted through the transmission medium, and retrieving one of the K subsets of data bits; and a bit parsing circuit (47) that receives each of the K subsets of data bits

from the K demodulators and reconstructs the N data bits transmitted by the transmitter (col. 6, lines 26-34).

(5) With regard to claim 16, Lindholm also discloses wherein the receiver further includes an input buffer (45) coupled between the K demodulators and the conducting medium.

(7) With regard to claim 19, Lindholm also discloses in Fig. 9c, wherein at least one of the K demodulators comprises: a down-conversion circuit (91a, 91b) that receives the signal from the conducting transmission medium and generates a symbol by converting the signal at the carrier frequency appropriate for the one of the K demodulators; an equalizer circuit (93) coupled to receive the symbol from the down-conversion circuit and create an equalized symbol; and a decoder (47) which receives the equalized symbol and retrieves the one of the K subsets of bits associated with the at least one of the K demodulators (col. 9, lines 23-40).

(8) With regard to claim 23, Lindholm also discloses in Fig. 9c, wherein the symbol includes an in-phase signal and a quadrature signal and the down-converter multiplies the received sum signal by a cosine function to retrieve the in-phase component and by a sine function to retrieve the quadrature component (col. 9, lines 28-34).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 3, 6, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) as applied to claim 2 above, in view of Applicant's Admitted Prior Art.

(1) With regard to claim 3, as noted above, Lindholm discloses all limitations of claim 2 above. Furthermore, Lindholm also discloses a symbol mapper coupled to receive the encoded signal and output a symbol (col. 5, lines 50-51); and an up-converter (Fig. 6, elements 62a, 62b) coupled to receive symbols from the symbol mapper and generate the output signal, wherein the up-converter outputs data at the carrier frequency of one of the K frequency separate channels that corresponds with the at least one of the K modulators (col. 6, line 56-col. 7, line 14).

Lindholm does not explicitly disclose wherein at least one of the K modulators includes a data encoder that receives the one of the K subsets of the N parallel bits of data associated with the at least one of the K modulators and outputs an encoded signal. However, Applicant's Admitted Prior Art teaches the use of an encoder (Fig. 1B, element 105) in the SERDES devices.

It would have been obvious to one skilled in the art to incorporate the teachings of Applicant's Admitted Prior Art with the teachings of Lindholm as a method of implementing a conventional SERDES device.

(2) With regard to claim 6, Lindholm also discloses wherein the symbol mapper is a QAM symbol mapper, which maps the encoded output signal into a symbol that includes an in-phase signal and a quadrature signal (col. 5, lines 45-50, Fig. 6).

(3) With regard to claim 9, Lindholm also discloses in Fig. 6, wherein the up-converter generates a first signal by multiplying (62a) the in-phase portion of the complex symbol by a sine function of the carrier frequency, generates a second signal by multiplying (62b) the out-of-phase

portion of the complex symbol by a cosine function of the carrier frequency, and summing (63) the first signal with the second signal to generate the output signal (50).

8. Claims 4, 5, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) in view of Applicant's Admitted Prior Art as applied to claim 3 above, and further in view of Rowan et al. (US Patent 6,407,843 B1).

(1) With regard to claim 4, as noted above, Lindholm in combination with Applicant's Admitted Prior Art disclose all limitations of claim 3 above. They do not however teach a digital-to-analog converter coupled between the symbol mapper and the up-converter. However, Rowan et al. discloses a digital-to-analog converter coupled between a symbol mapper and an up-converter (col. 6, lines 45-50).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Rowan et al. with the combined teachings of Lindholm and Applicant's Admitted Prior Art as a method of achieving high data rates with high bandwidth efficiencies.

(2) With regard to claim 5, Rowan et al. also discloses in Fig. 4, the use of a trellis encoder (406).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Rowan et al. with the combined teachings of Lindholm and Applicant's Admitted Prior Art as a method of achieving high data rates with high bandwidth efficiencies.

(7) With regard to claim 7, Lindholm discloses filtering pulse shape filtering n Fig. 6. though he is silent as to the type of filtering, it would be obvious to one skilled in the art that the type of filtering would be a mere design choice.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) in view of Applicant's Admitted Prior Art and further in view of Rowan et al. (US Patent 6,407,843 B1) as applied to claim 4 above, and further in view of Miller et al. (US Patent 5,930,231). As noted above, the combination of Lindholm, Applicant's Admitted Prior Art and Rowan et al. disclose all limitations of claim 4 above. They do not however teach the system further including a low pass filter analog filter coupled between the digital-to-analog converter and the up-converter.

However, Miller et al. teaches in Fig. 10, low pass filter analog filter coupled between the analog-to-digital converter and a quadrature down-converter. It would be inherent that the opposite configuration would make up the up-conversion portion in the transmitter.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Miller et al. with the teachings of Lindholm, Applicant's Admitted Prior Art and Rowan et al. as a method of processing predetermined spectral subbands within a predetermined spectral band.

10. Claims 10, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) as applied to claim 1 above, an further in view of Applicant's Admitted Prior Art.

(1) With regard to claim 10, as noted Lindholm discloses all limitations of claim 1 above. Furthermore, Lindholm does not explicitly teach wherein the transmission medium is a copper backplane. However, Applicant's Admitted Prior Art discloses wherein the transmission medium

is a copper backplane (pg. 2, lines 22-23) and the transmitter includes a differential output driver (pg. 2, lines 7-9).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Applicant's Admitted Prior Art with the teachings of Lindholm as a method of implementing a conventional SERDES device.

(2) With regard to claim 11, Applicant's Admitted Prior Art also discloses wherein the transmission medium is FR4 copper trace (pg. 2, lines 22-23) and the transmitter includes a differential output driver (pg. 2, lines 7-9).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Applicant's Admitted Prior Art with the teachings of Lindholm as a method of implementing a conventional SERDES device.

11. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) as applied to claim 15 above, an further in view of Applicant's Admitted Prior Art.

As noted above, Lindholm discloses all limitations of claim 15 above. Lindholm does not however explicitly teach wherein the input buffer receives a differential sum signal.

However, Applicant's Admitted Prior Art teaches in Fig. 1C, receiving a differential signal in a conventional SERDES device.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Applicant's Admitted Prior Art with the invention of Lindholm as a method of implementing a conventional SERDES device.

12. Claims 20, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) as applied to claim 19 above, and further in view of Rowan et al. (US Patent 6,407,843).

(1) With regard to claim 20, claim 20 inherits all limitations of claim 19 above. As noted above, Lindholm discloses all limitations of claim 19 above. Lindholm does not however disclose an analog-to-digital converter coupled between the down-converter and the equalizer.

However, Rowan et al. discloses in Fig. 9B, an analog-to-digital converter coupled between the down-converter and the equalizer (pg. 7, lines 4-21).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Rowan et al. with the invention of Lindholm as a method of achieving high data rates with high bandwidth efficiencies.

(2) With regard to claim 21, Lindholm discloses in Fig. 9c, the use of low pass filtering (92a, 92b) to remove interfering spectral components (anti-aliasing) (col. 9, lines 30-32).

13. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) as applied to claim 19 above, and further in view of Isaksson et al. (US Patent 6,438,174 B1).

As noted above, Lindholm discloses all limitations of claim 19 above. Lindholm does not however disclose wherein the equalizer parameters are adaptively chosen.

However, Isaksson et al. discloses in a multi-carrier transmission system wherein equalizer parameters are adaptively chosen (col. 18, lines 30-38).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Isaksson et al. with the invention of Lindholm as a method of controlling equalization dependant upon constellation size and other parameters.

14. Claims 27, 28, 30, 34-35, 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) in view of Applicant's Admitted Prior Art.

(1) With regard to claim 27, Lindholm discloses in Fig. 4, a method of communicating between components over a conducting (col. 6, line 15) transmission medium, comprising: separating N bits into K subsets of bits (41); mapping each of the K encoded subsets of bits onto a symbol set to generate a K symbols representing each of the K subsets of bits (col. 5, lines 50-52); up-converting each of the K symbols to form an up-converted signal at one of a set of K carrier frequencies (Fig. 6, elements 61a, 61b); summing the up-converted signals representing each of the K subset of bits to generate a transmit sum signal (Fig. 4, element 43); and coupling (Fig. 4, element 44) the transmit sum signal to the conducting transmission medium.

Lindholm does not explicitly disclose encoding each of the K subsets of bits to form encoded subsets of bits.

However, Applicant's Admitted Prior art teaches (pg. 2, lines 3-10) encoding each of the K subsets of bits to form encoded subsets of bits.

It would have been obvious to one skilled in the art to combine the teachings of Applicant's Admitted Prior Art with the teachings of Lindholm as a method of ensuring a minimum rate of data transitions in the output data stream.

(2) With regard to claim 28, Lindholm also discloses wherein symbols transmitted at lower carrier frequencies represent fewer bits than symbols transmitted at higher carrier frequencies (col. 5, lines 48-54).

(3) With regard to claim 30, Lindholm also discloses wherein mapping each of the encoded subsets includes QAM mapping (col. 5, line 45).

(4) With regard to claim 34, Lindholm also discloses, the method further including receiving a receive sum signal (Fig. 4, element 43) from the conduction transmission medium, the receive sum signal being the transmit sum signal after transmission through the conducting transmission medium; down-converting (Fig. 9c, elements 91a, 91b) the received sum signal into a set of K signals; equalizing (93) each of the K signals to receive equalized symbols; decoding the equalized symbols to reconstruct the K subsets of bits; and parsing (47) K subsets of bits into N bits (col. 9, lines 23-40).

(5) With regard to claim 35, Applicant's Admitted Prior Art also discloses the method of claim 34, wherein receiving the receive sum signal includes receiving a differential signal from a copper transport medium (pg. 2, line 8).

It would have been obvious to one skilled in the art to combine the teachings of Applicant's Admitted Prior Art with the teachings of Lindholm as a method of implementing a conventional SERDES device.

(6) With regard to claim 37, Lindholm also discloses wherein down-converting the received sum signal includes receiving a symbol transmitted at a corresponding carrier frequency (col. 9, lines 23-31).

15. Claims 29, 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) in view of Applicant's Admitted Prior Art as applied to claim 27 above and further in view of Rowan et al. (US Patent 6,407,843 B1).

(1) With regard to claim 29, as noted above, Lindholm in combination with Applicant's Admitted Prior Art discloses all limitations of claim 27 above. They do not however disclose wherein encoding each of the K subsets of bits includes encoding at least one of the K subsets of bits with a trellis encoder.

However, Rowan et al. discloses in Fig. 4, wherein encoding each of the K subsets of bits includes encoding at least one of the K subsets of bits with a trellis encoder.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Rowan et al. with the combined teachings of Lindholm and Applicant's Admitted Prior Art as a method of achieving high data rates with high bandwidth efficiencies.

(2) With regard to claim 31, Rowan et al. also discloses in Fig. 9B, converting the K symbols to analog signals.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Rowan et al. with the combined teachings of Lindholm and Applicant's Admitted Prior Art as a method of achieving high data rates with high bandwidth efficiencies.

(3) With regard to claims 32 and 33, Rowan et al. also discloses in Fig. 9B, providing filtering (914A) prior to converting the K symbols to analog signals. Rowan et al is silent as to the type of filtering. It would be obvious to one skilled in the art that the type of filtering used would be a mere design choice.

16. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) in view of Applicant's Admitted Prior Art as applied to claim 34 above, and further in view of Miller et al. (US Patent 5,930,231).

Claim 38 inherits all limitations of claim 34. As noted above, Lindholm in combination with Applicant's Admitted Prior Art disclose all limitations of claim 34. The do not however disclose providing automatic gain control.

However, Miller et al. teaches in Fig. 18, providing automatic gain control. It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Miller et al. with the teachings of Lindholm, Applicant's Admitted Prior Art and Rowan et al. as a method of processing predetermined spectral subbands within a predetermined spectral band.

17. Claims 39, 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) in view of Applicant's Admitted Prior Art as applied to claim 34 above, and further in view of Rowan et al. (US Patent 6,407,843 B1).

(1) With regard to claim 39, claim 39 inherits all limitations of claim 34 above. As noted above, Lindholm in combination with Applicant's Admitted Prior Art disclose all limitations of claim 34 above. They do not however teach the method including analog-to-digital conversion. However, Rowan et al. discloses a digital-to-analog conversion in Fig. 9B (col. 6, lines 45-50).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Rowan et al. with the combined teachings of Lindholm and Applicant's Admitted Prior Art as a method of achieving high data rates with high bandwidth efficiencies.

(2) With regard to claim 43, Rowan et al. also discloses trellis decoding (Fig. 4) and QAM decoding (Fig. 11).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Rowan et al. with the combined teachings of Lindholm and Applicant's Admitted Prior Art as a method of achieving high data rates with high bandwidth efficiencies.

18. Claims 41, 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) in view of Applicant's Admitted Prior Art as applied to claim 34 above, and further in view of Miller et al. (US Patent 5,930,231).

(1) With regard to claim 41, claim 41 inherits all limitations of claim 34 above. As noted above, Lindholm in combination with Applicant's Admitted Prior art disclose all limitations of claim 34 above. They do not however, explicitly disclose providing adaptively controlled filtering for timing recovery.

However, Miller et al discloses in Fig. 24, providing adaptively controlled filtering for timing recovery.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Miller et al. with the teachings of Lindholm, Applicant's Admitted Prior Art and Rowan et al. as a method of processing predetermined spectral subbands within a predetermined spectral band.

(2) With regard to claim 42, Miller et al. discloses wherein the symbols are complex (col. 35, lines 62-64) and further providing adaptively controlled phase rotation (Fig. 18).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Miller et al. with the teachings of Lindholm, Applicant's Admitted Prior Art and Rowan et al. as a method of processing predetermined spectral subbands within a predetermined spectral band.

19. Claims 46-48, 51-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) in view of Applicant's Admitted Prior Art.

(1) With regard to claim 46, Lindholm discloses in Fig. 4, a transceiver comprising: a transmitter portion (42), the transmitter portion coupled to receive N parallel bits of data and transmit the N parallel bits of data into a first set of K frequency separated channels (col. 5, lines 36-48) on a conducting transmission medium (col. 6, line 15), where N and K are integers; and a receiver portion (46) coupled to receive data from a second set of K frequency separated channels from the conducting transmission medium and recover the N parallel bits of data (col. 9, lines 23-40). Lindholm does not however explicitly disclose the transceiver on a chip, though transceiver chips are well known in the art.

However, Applicant's Admitted Prior Art teaches a transceiver chip for the exact purpose of Lindholm's invention (pg. 1, line 21, pg. 2, line 22).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Applicant's Admitted Prior Art with the invention of Lindholm as a method of implementing a conventional SERDES device.

(2) With regard to claim 47, Lindholm also discloses wherein the first set of K frequency separated channels have substantially identical carrier frequencies with the second set of K frequency separated channels (col. 6, lines 1-4).

(3) With regard to claim 48, Lindholm also discloses in Fig. 4, wherein the transmitter comprises: a bit allocation circuit (41) that receives the N parallel bits of data and creates K subsets of data bits; and K modulators (A1-An), wherein each of the K modulators encodes one of the K subsets of the N parallel bits of data and creates an output signal modulated at a carrier frequency associated with one of the first set of K frequency separated channels; and an adder (43) that receives the output signal from each of the K modulators and generates a transmit sum signal for transmission on a conducting (col. 6, line 15) transmission medium (col. 5, lines 36-50).

(4) With regard to claim 51, Lindholm also discloses in Fig. 4, wherein the receiver comprises: K demodulators (B1-Bn), each of the K demodulators coupled to receive a signal from the conduct transmission medium (col. 6, line 15), the signal being the transmit sum signal(43) transmitted through the conducting transmission medium, and retrieving one of the K subsets of data bits; and a bit parsing circuit (47) that receives each of the K subsets of data bits from the K demodulators and reconstructs the N data bits transmitted by the transmitter.

(5) With regard to claim 52, Lindholm also discloses in Fig. 9c, wherein at least one of the K demodulators comprises: a down-conversion circuit (91a, 91b) that receives the signal from the transmission medium and generates a symbol by converting the signal at the carrier frequency appropriate for the one of the K demodulators; an equalizer circuit (93) coupled to receive the symbol from the down-conversion circuit and create an equalized symbol; and a

decoder (47) which receives the equalized symbol and receives the one of the K subsets of bits associated with the at least one of the K demodulators (col. 9, lines 23-40).

20. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) as applied to claim 48, above and further in view of Applicant's Admitted Prior Art.

(1) With regard to claim 48, claim 48 inherits all limitations of claim 46 above. As noted above, Lindholm in combination with Applicant's Admitted Prior Art disclose all limitations of claim 46. Furthermore, Lindholm also discloses in Fig. 4, symbol mapper (element 48, col. 5, lines 50-54) to output a symbol, an upconverter (Fig. 6, elements 62a, 62b) coupled to receive symbols to receive symbols from the symbol mapper and generate the output signal, wherein the up-converter outputs data at the carrier frequency of one of the K frequency separate channels that corresponds with the at least one of the K modulators (col. 6, line 56- col. 7, line 14). Lindholm does not explicitly disclose at least one of the K modulators includes a data encoder that receives the one of the K subsets of the N parallel bits of data associated with the at least one of the K modulators and outputs an encoded signal.

However, Applicant's Admitted Prior Art teaches a data encoder that receives the one of the K subsets of the N parallel bits of data associated with the at least one of the K modulators and outputs an encoded signal.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Applicant's Admitted Prior Art with the invention of Lindholm as a method of implementing a conventional SERDES device.

21. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lindholm (US Patent 6,477,207 B1) in view of Applicant's Admitted Prior Art as applied to claim 49, above and further Rowan et al. (US Patent 6,407,843 B1).

As noted above, Lindholm in combination with Applicant's Admitted Prior Art disclose all limitations of claim 49. Furthermore, Lindholm wherein the symbol mapper is a QAM symbol mapper (col. 5, lines 44-52). They do not however disclose wherein the encoder is a trellis encoder. However, Rowan et al. discloses in Fig. 4, the use of a trellis encoder (406).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Rowan et al. with the combined teachings of Lindholm and Applicant's Admitted Prior Art as a method of achieving high data rates with high bandwidth efficiencies.

Claim Rejections - 35 USC § 103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

23. Claims 44, 45 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Lindholm (US Patent 6,477,207 B1).

(1) With regard to claim 44, Lindholm discloses in Fig. 4, a system for communication between components, comprising: means (41) for allocating N bits of input data into K subsets; means (A1-An) for encoding each of the K subsets; and means (42) for transmitting each of the K subsets into one of K channels on a conducting transmission medium. Lindholm is silent as to

encoding. However, it is well known in the art that quadrature amplitude modulation involves encoding bit sequences.

(2) With regard to claim 45, Lindholm also discloses in Fig. 9c, the system of claim 44, further comprising: means (65) for receiving data from the K channels; means for correcting the data for intersymbol interference (93): means for retrieving the K subset; and means for retrieving the N data bits (47; col. 9, lines 22-40).

Allowable Subject Matter

24. Claims 22, 24-25, 40 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

25. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a.) Dong et al. discloses in US Patent 5,535,228 Device and Method For Achieving Rotational Invariance In A Multi-Level Trellis Coding System.

b.) Gaikwad et al. discloses in US 6,292,559 B1 Spectral Optimization And Joint Signaling Techniques With Upstream/Downstream Separation For Communication In The Presence of Crosstalk.

c.) Tanaka et al. Discloses in US Patent 5,999,575 Channel Separating Filter Apparatus, PSK Demodulator Apparatus and PSK Receiver Apparatus Each Equipped With Channel Separating Filter Apparatus.

d.) Isaksson et al. discloses in US Patent 6,160,820 Multi-Carrier Transmission Systems.

e.) Eldering et al. discloses in WO 00/51303 Apparatus and Method of Tone Allocation in Digital Subscriber Line Systems.

f.) Bohm discloses in US Patent 6,246,664 B1 Modulator For Modulating Digital Signals.

g.) Hansen discloses in US Patent 6,807,234 B2 Method And Apparatus For Constellation Mapping And Bitloading In Multi-Carrier Transceivers, Such As DMT-Based DSL Transceivers.

h.) Crawford discloses in US Patent 5,796,783 Digital Transmission System.

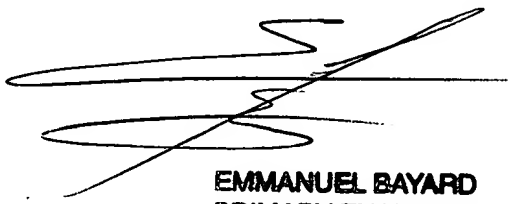
27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on 571-272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lawrence B. Williams

lbw
November 3, 2005



EMMANUEL BAYARD
PRIMARY EXAMINER